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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/668,938	09/25/2000	Volker Rasche	PHD99.130US	2720

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EXAMINER	
KAO, CHIH CHENG G	
ART UNIT	**PAPER NUMBER**
2882	

DATE MAILED: 08/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/668,938	RASCHE ET AL.	
	Examiner	Art Unit	
	Chih-Cheng Glen Kao	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-10,18 and 20-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *18,20 and 21* is/are allowed.

6)☒ Claim(s) *1,2,4-10 and 22-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 September 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 4, 5, 7, and 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hounsfield (US Patent 3952201) in view of Fujita (US Patent 5482042).

2. Regarding claim 1, Hounsfield discloses a method for acquiring an image data set of a moving organ (Abstract, lines 1-3) comprising: defining a plurality of different positions of an x-ray device (col. 1, lines 30-34) comprising an x-ray source (Fig. 1, #1) and an x-ray detector (Fig. 1, #4) in a common plane (col. 1, lines 32-34), defining an x-ray cycle in which all x-ray positions are successively occupied (Fig. 2(c)), detecting a motion signal of a body organ including a low-motion phase and a high motion phase (col. 1, lines 39-42, and Figs. 2(a)-2(c)), simultaneously with detection of the motion signal, successively moving the device to all x-rays positions in an x-ray cycle and acquiring a plurality of projection data sets when the x-ray device is in a respective one of the positions (Figs. 2(a)-2(c)), successively completing a plurality of x-ray cycles (Fig. 2(c)), controlling movement of the x-ray device (col. 3, lines 35-49) by means of the motion signal such that a projection data during the low motion phase of the organ is acquired when the x-rays device is in each x-ray position (Fig. 2(c)) by controlling a start of each

x-ray cycle base on the motion signal (Fig. 2(a)) to cause each x-ray cycle to commence at a different instant in the different phases of the motion of the organ (Fig. 2(c)) in relationship to Fig. 2(a))), and using projection data sets acquired during low-motion phases for formation of the image data set (Figs. 2(a)-2(c)).

However, Hounsfield does not disclose acquiring a three-dimensional image.

Fujita teaches acquiring a three-dimensional image (col. 1, lines 26-39).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the method of Hounsfield with the three-dimensional imaging of Fujita, since one would be motivated to use three-dimensional imaging to see a volumetric image of the object of interest as implied from Fujita (col. 1, lines 26-39).

3. Regarding claim 2, Hounsfield further discloses wherein only projection data sets acquired during the same motion phases are selected and used (Figs. 2(a)-2(c)).

4. Regarding claim 4, Hounsfield further discloses wherein the x-ray device is controlled such that projection data is acquired only during low-motion phases (Figs. 2(a)-2(c)).

5. Regarding claim 5, Hounsfield further discloses wherein the x-ray device is on exclusively during low-motion phases of the body organ (Figs. 2(a)-2(c)).

6. Regarding claim 7, Hounsfield further discloses a cardiac motion signal (Abstract and Figs. 2(a)-2(c)).

7. Regarding claim 22, Hounsfield further discloses defining x-ray positions on a semi-circular arc (Fig. 2(c), 0^0 to β^0).

8. Regarding claim 23, Hounsfield further discloses the x-ray positions in set positions (Fig. 1 and Fig. 2(c), 0^0 to β^0).

9. Regarding claim 24, Hounsfield further discloses the organ as a heart (col. 3, lines 1-2).

10. Regarding claim 25, Hounsfield further discloses the x-ray positions including an initial x-ray position (Fig. 2(c), 0^0) and a final x-ray position (Fig. 2(c), β^0) and further comprising the steps of beginning each cycle in the initial position (Fig. 2(c), 0^0), ending each cycle in the final position (Fig. 2(c), β^0), and then moving the device from the final position back to the initial position to begin a subsequent x-ray cycle (Fig. 2(c), period between β^0 of the first revolution and 0^0 of the second revolution).

11. Regarding claim 26, Hounsfield further discloses the device moved from the final position to the initial position in a time interval (Fig. 2(c), period between β^0 of the first revolution and 0^0 of the second revolution) which allows the subsequent x-ray cycle to commence at a different phase of motion (Fig. 2(c) in relationship to Fig. 2(a)).

12. Regarding claim 27, Hounsfield further discloses the step of defining the positions on the arc with the initial position opposite the final position (Fig. 2(c), 0^0 and β^0).

13. Regarding claim 28, Hounsfield further discloses a time interval between consecutive cycles to enable the x-ray device to return to an initial x-ray position from a final x-ray position (Fig. 2(c), period between β^0 of the first revolution and 0^0 of the second revolution).

14. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hounsfield in view of Fujita as applied to claims 1 and 7 above, and further in view of Richey et al. (US Patent 4547892).

Hounsfield in view of Fujita suggests a method as recited above.

However, Hounsfield does not disclose a respiratory and cardiac motion signal.

Richey et al. teaches a respiratory and cardiac motion signal (Claims 1 and 7).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested method of Hounsfield in view of Fujita with the respiratory and cardiac motion signal of Richey et al., since one would be motivated use this to obtain images that are not blurred by motion as implied from Richey et al. (col. 5, lines 55-61).

15. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hounsfield in view of Fujita and Richey et al. as applied to claim 8 above, and further in view of Koka et al. (US Patent 4751644).

Hounsfield in view of Fujita and Richey et al. suggests a method as recited above.

However, Hounsfield does not disclose a respiratory motion signal to correct projection data sets acquired in different respiratory motions phases.

Koka et al. teaches a motion signal to correct projection data sets acquired in different motion phases (col. 3, lines 43-51).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested method of Hounsfield in view of Fujita and Richey et al. with the correction of projection data sets of Koka et al., since one would be motivated use this to obtain images for a selected phase as shown by Koka et al. (col. 3, lines 43-51).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested method of Hounsfield in view of Fujita, Richey et al., and Koka et al. with the respiratory motion signal correcting images, since respiratory and cardiac motion signals are considered art recognized equivalents in that they both relate to motions that can create image distortions as implied from Richey et al. (col. 5, lines 55-61). It would have been within ordinary skill in the art to substitute one type of signal for another. One would be motivated to use a respiratory signal for better images without the blurriness due to motion as implied from Richey et al. (col. 5, lines 55-61).

16. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hounsfield in view of Fujita and Richey et al. as applied to claim 6 above, and further in view of Suzuki et al. (US Patent 4878499).

Hounsfield in view of Fujita and Richey et al. suggests a method as recited above.

However, Hounsfield does not disclose further informing the patient that a desired respiratory motion phase has been reached based on a respiratory motion signal.

Suzuki et al. teaches further informing the patient that a desired respiratory motion phase has been reached based on a respiratory motion signal (col. 5, lines 25-40).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the suggested method of Hounsfield in view of Fujita and Richey et al. with the informing of Suzuki et al., since one would be motivated use this to ensure that everyone knows that the best image is being created as implied from Suzuki et al. (col. 5, lines 25-40).

Allowable Subject Matter

17. Claims 18, 20, and 21 contain allowable subject matter.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 18, prior art does not disclose or fairly suggest a method for acquiring a three-dimensional image data set of a moving organ including the step of maintaining an x-ray device in an x-ray position when a low-motion phase is not present and continuously determining whether the low motion phase is present until a positive determination is obtained and thereafter acquiring a projection data set and continuing movement of the x-ray device, as specified in combination with all the limitations in the claim. Claims 20 and 21 contain allowable subject matter by virtue of their dependency.

Response to Arguments

18. Applicant's arguments filed 5/12/04 have been fully considered but they are not persuasive.

Regarding claim 1 and as noted by the Applicant, Hounsfield shows that the second revolution starts at a different instant during the motion signal than the first revolution. However, the Examiner disagrees with Applicant's opinion that this is an incidental result and does not imply intentionally basing the start of each x-ray cycle on the motion signal or considering the motion signal when determining the start of each x-ray cycle. As further illustrated in column 3, lines 6-12 and 35-50, the circuit, which is processed from the e.c.g., computes the rotational speed to ensure that "ON" periods of the radiation source occur, on the or a subsequent rotation, at angular positions such as alpha-beta. As seen in the first rotation or revolution in Figures 2(a)-2(c), the radiation source is on during the low-motion phase in the angular positions from 0 to alpha. Since the radiation source was not turned on in angular positions alpha to beta due to the high-motion phase, the rotational speed is computed and calculated intentionally to insure that the radiation source is turned on during the second rotation or revolution in the angular positions alpha to beta. Thus, the step of controlling the movement of the x-ray device comprising the step of controlling a start of each x-ray cycle based on the motion signal is done through this process disclosed by Hounsfield, which is not an incidental result and implies intentionally basing the start of each x-ray cycle on the motion signal or considering the motion signal when determining the start of each x-ray cycle. Furthermore, as noted by the Applicant, the rotation continues with only its speed of rotation being variable. This

calculation or computation of the variable speed is the method step that implies the start of the x-ray cycle based on the motion signal. Therefore Hounsfield does disclose "controlling a start of each of the X-ray cycles based on the motion signal".

Regarding claims 22 and 23, in response to the Applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which the Applicant relies (i.e., defining an x-ray cycle in which x-ray positions along only a semi-circular arc are successively occupied) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. Note that Hounsfield does dislcose defining set x-ray positions along a semi-circular arc (Fig. 2(c), 0 to beta).

Regarding claims 25-27, as noted by the Applicant, the Examiner does consider the x-ray position at 0 in Hounsfield to be an initial position and the x-ray position at beta to be a final position. This is analogous to the Applicant's interpretation of an initial position (Figs. 2 and 4, P0) and a final position (Figs. 2 and 4, P16) as defined by the Applicant. If the Applicant were to define the final position of Hounsfield at 360, this would be analagous to defining P0 in the second rotation as seen in Figures 2 and 4 of the Applicant's application as the final position. Obviously, as noted by the Applicant, this is not the case, since such a characterization of the initial and final positions would create a situation where there cannot be any movement of the x-ray device from the final position to the intitial position between successive x-ray cycles and where the initial and final positions cannot be opposite one another on a semi-circular arc. Again, if the position at 0 of Hounsfield is defined as the initial x-ray position and the position at beta is defined as the final position, then the x-ray device will move from the final x-ray position

back to the initial x-ray position (as seen from the transition from beta to 360, which is equivalent to 0, in Figure 2(c)) to begin a subsequent x-ray cycle at 0. Furthermore, the x-ray device is moved from the final x-ray position to the initial x-ray position in a time interval which allows the subsequent x-ray cycle to commence at a different phase of motion of the organ (Figs. 2(a) and 2(c)). In addition, the x-ray positions from 0 to beta define x-ray positions on a semi-circular arc with the initial position being opposite the final position (Fig. 2(c)).

Conclusion

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however,

will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gk

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER